

Simon-Beril Describes a circuitry device, with a controller, memory and power supply (cell or battery), which is mounted to an extinguisher seat (or to the extinguisher housing) for monitoring sensors associated with the fire extinguisher, including pressure status (electrical contact between a fixed surface and a moveable pointer), inspection status, removal from a bracket, and issuing a local alarm (audible and/or visual (electroluminescent diode, disposed in a visible location protected against shocks)) when a sensor is triggered. The system may include also a visual screen and a keyboard which may be incorporated into the device mounted at the extinguisher, or may be carried by an inspector during rounds from extinguisher to extinguisher. There is no teaching or suggestion for transmitting or receiving signals from a remote location.

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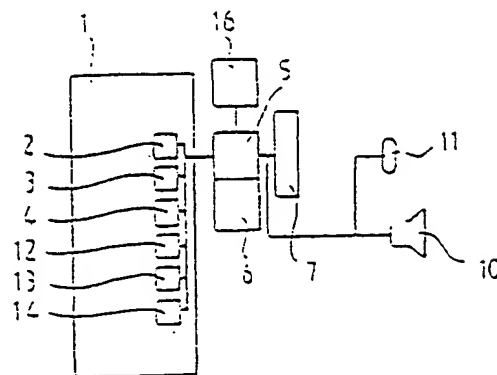
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(54) Electronic control and monitoring device for mobile fire extinguishers.

(57) An electronic device designed to be
used with an extinguisher (1) and comprising
sensors (2, 3, 4, 12, 13, 14) detecting the
malfunctioning and activation of the said
extinguisher (1) and connected mechanically
thereto.

The sensors (2, 3, 4, 12, 13, 14) are
connected electrically to at least one alarm
(10, 11) in such a way that the said alarm or
alarms (10, 11) are triggered as soon as one
of the sensors (2, 3, 4, 12, 13, 14) detects
a malfunction or an activation of the
extinguisher (1).



The present invention concerns an electronic control and monitoring device for a mobile fire extinguisher permitting visualization of the working condition thereof, the triggering of an alarm in the event of a malfunction, and the storing of dates and events.

Inspection of mobile fire extinguishers is currently limited to their outer appearance: examination of the handle, lever and puncturing pin, as well as the locking pin.

Certain mechanical devices with the shifting of a reference mark indicate whether the extinguisher has undergone puncture¹. Other devices equipped with manometers indicate the pressure inside the extinguisher.

The results of these inspections are usually entered on a maintenance tag or in a notebook.

These means are not very reliable and do not alert the user to a malfunction or to the need for intervention or inspection by an inspector. Finally, the results of the inspections can be mislaid or changed.

The purpose of the present invention is to eliminate these disadvantages by providing an electronic device designed to equip an extinguisher, comprising sensors detecting the malfunctioning and activation of the extinguisher and connected mechanically thereto, this device being characterized essentially in that the sensors are connected electrically to at least one alarm in such a way that said alarm or alarms are triggered as soon as one of the sensors detects a malfunction or an activation of the extinguisher.

¹Translator's Note: In French literally "percussion".

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According to a preferred embodiment, the device according to the invention also comprises a controller, a memory and a clock, the controller loading into the memory the malfunction data transmitted to it by the sensors and the dates of these malfunctions transmitted to it by the clock.

According to other embodiments, the device according to the invention further comprises a display unit and/or an input and output connector for stored data.

The device according to the invention can be integrated into or connected to any type of extinguisher, thereby enabling the user of a mobile, hand-held, portable or wheeled fire extinguisher to be informed of and/or alerted to the following conditions:

- for "auxiliary-pressure" units, also known as "pressurized-on-use" units: whether or not the cartridge (commonly known as the "sparklet") containing the pressurized liquefied gas has been punctured, with recording of the puncture date and time.

- for "stored-pressure" units: the charge or pressure state of the extinguishing agent with propellant gas.

- the date of the most recent and the next periodic technical inspection.

- other information useful to the manufacturer, user or inspector, such as, for example, the date the unit went into service, the expiration date, the date of retesting by the Department of Mines, the recharging date, the empty and charged weights, the identification number.

In addition, the device according to the invention gives the inspector access to the functions and the memory so that useful data can be added thereto.

The following description, provided for explanatory purposes and nonrestrictively with reference to the attached drawing, will give a better understanding of the advantages, aims and characteristics of the present invention.

In the attached drawing:

- Figure 1 is a circuit diagram of a first embodiment of a device according to the invention.

- Figure 2 depicts a second embodiment of a device according to the invention.

- Figure 3 depicts a communication box with the embodiments described with reference to Figs. 1 and 2.

- Figure 4 depicts an electronic circuit incorporated into the embodiment described with reference to Fig. 2.

Referring first to Fig. 1, depicted therein is an extinguisher 1, sensors 2, 3, 4, 12, 13 and 14 connected to the extinguisher 1, [and] a controller 5 connected electrically to sensors 2, 3, 4, 12, 13 and 14 and to a memory 6, a clock 16, a connector 7, an auditory alarm 10 and a visual alarm 11.

Sensors 2, 3, 4, 12, 13 and 17 [sic] measure physical data characterizing the state of the extinguisher 1 and detect either the malfunctioning or the activation thereof.

For example, in cases where the extinguisher 1 is an auxiliary-pressure type comprising a cartridge (also known as a "sparklet"), a puncturing pin, [and] an arming and puncturing lever, sensor 2 is an electrical contact of a type known per se, detecting the puncturing of the cartridge and comprising two conductive

surfaces, one of these surfaces being fixed and the other movable with the puncturing pin and the lever.

In cases where the extinguisher 1 is the stored-pressure type comprising a manometer with a movable part, sensor 12 is an electrical contact of a type known per se, detecting the crossing of a predetermined pressure threshold and comprising two conductive surfaces; one of these surfaces being fixed and the other movable with the movable part of the manometer.

Sensor 3 is connected to a mounting bracket of the extinguisher 1 and detects the separation of the extinguisher 1 from this mounting bracket, and it can be a simple electrical contact.

Controller 5 and memory 6 are of types known in particular in the design of portable computers. They are preferably integrated into a single, microcontroller-type electronic component.

The clock 16 delivers electrical signals signifying the date and time to controller 5. Controller 5 transmits to memory 6 the data regarding the malfunctioning or activation of the extinguisher 1 which it receives from sensors 2, 3, 4, 12, 13 and 14, as well as the date and time of these events.

Based on the data transmitted to it by sensors 2, 3, 4, 12, 13 and 14, controller 5 triggers the operation of the auditory and visual alarms 10 and 11, respectively. The auditory alarm 10 can consist, for example, of an oscillator and a speaker or buzzer. The visual alarm 11 consists of a light source, optionally flashing.

Several different alarm signals can be generated by the device according to the invention, for example by the alternating shutoff and operation of the alarms or by variation of the alarm transmission frequency.

The connector 7 serves to connect controller 5 to an external box, described with reference to Fig. 3, so as to transmit to this external box the data stored in memory 6 and to transmit additional data to memory 6, these operations being performed under the control of controller 5.

The electrical power supply (not shown) of the device comprises either a cell, a battery, or a photovoltaic cell.

Controller 5 is adapted to monitor the various components of the device to ensure that they are in proper working order, in particular by periodically disconnecting and reconnecting each of these components. The electric power supply is also monitored.

The principal advantage of this first embodiment of the device is that it is light-weight and easy to incorporate into an extinguisher of a known type.

Turning now to Fig. 2, this drawing depicts the elements of Fig. 1 with the addition of a display screen 8 and a keypad 9 electrically connected to the controller 5.

The functions of the elements described with reference to Fig. 1 are unchanged, controller 5 additionally managing the communication with the additional elements 8 and 9.

Keypad 9 is used for communication between the user and controller 5, while display screen 8 serves to display the data stored by memory 6 and messages transmitted by keypad 9.

To limit use of the device to certain users, a code can be stored in memory 6, and at the beginning of a utilization of keypad 9, controller 5 compares this code with the data from keypad 9. If these data match, it releases the other communication functions. If not, it waits for the user to find the code. The realization of this function is known, especially in alarms.

Memory 6 can also store the principal dates in the history of the extinguisher, the initial implementation date, the most recent and next inspection dates, the date of inspection by the Department of Mines. When the date of the next inspection arrives, the auditory and visual alarms 10 and 11 are triggered by controller 5. To achieve this function, controller 5 compares on a daily basis the next inspection date stored in memory 6 with the date given by the clock 16, and if they are the same, triggers alarms 10 and 11.

A specialized electronic circuit performing all of these functions is depicted in Fig. 4.

The principal advantage of this second embodiment of the device lies in its autonomy. No additional system is needed for its operation, in contrast to the first embodiment, which must be supplemented by a box as depicted in Fig. 3.

Another advantage of this second embodiment lies in its performance and in its ability to signal that the inspection date has arrived.

Other embodiments of the device can be realized by adding to the components depicted in Fig. 1 some of the components depicted in Fig. 2. In particular, the auditory and visual alarms 10 and 11 can be added to the device as depicted in Fig. 1 to provide ongoing security.

As a variant of the two embodiments depicted in Figs. 1 and 2 which is adapted to auxiliary-pressure extinguishers, controller 5 orders puncture to take place as soon as sensor 3 senses that extinguisher 1 is separated from its mounting bracket. According to this variant, a means is provided to cancel this function for inspection and transport of the extinguisher 1. Also according to this variant, controller 5 triggers an auditory or visual alarm as soon as sensor 3 detects the separation of the extinguisher from its mounting bracket.

With reference now to Fig. 3, depicted therein is an electronic box 20 comprising a connector 21, a display unit 22, a keypad 23, a printer connector 24, a memory 25, a printer 26 and a controller 27 which is electrically connected to all the other components.

Connector 21 is adapted to be connected to connector 7, described with reference to Figs. 1 and 2. Display unit 22 is adapted to display letters, symbols and numbers. Display unit 22, keypad 23 and printer connector 24 are of known types. Memory 25 and controller 27 are the same types as memory 6 and controller 5. In particular, they are preferably integrated into a single, microcontroller-type component. Controller 27 is adapted to communicate with controller 5 via connectors 7 and 21.

Printer 26 is a small-format printer. It prints messages and dates, either on ordinary paper or on a tag attached to the extinguisher 1.

Controller 27 communicates with controller 5, receiving from it the data stored in memory 6 and transmitting to it data and dates which controller 5 saves to memory 6.

The electronic box 20 can be kept by the person checking or inspecting the extinguisher 1, who can use it to re-update the dates stored in memory 6 and to process the data stored in this memory 6 to determine all the events in its history.

Memory 25 can store a code identical to that stored in memory 6, this code being modifiable and being transmitted upon the activation of the box described with reference to Fig. 3, in order to control the operation of controller 5.

With reference to Fig. 4, depicted therein is an electronic circuit comprising a display unit 8 having seven digits of seven segments each, a microcontroller 30, a connector 7, a power supply 31, a connector 32, a buzzer 33, an electroluminescent diode 34 and a keypad 35 with four switches.

Microcontroller 30 can be realized as a dedicated integrated circuit, for example of the precharacterized, predistributed type, or alternatively as a programmable logic gate matrix.

Of the seven digits of the display unit 8, the six digits at the right are designed to display a date, while the seventh corresponds to a data code, for example "P" for "next [*prochaine*] inspection."

Keypad 35 includes function keys or operates by combining or modulating the pressures exerted on its switches.

Connector 32 is adapted to transmit the same data as connector 7, except for the modification of the data stored in the memory of microcontroller 30. Connector 7 has a special shape such that only a box such as that described with reference to Fig. 3 can be connected thereto.

The electronic circuit depicted can be disposed in a specially adapted seat, in the fittings of the extinguisher or on or in its body, display unit 8 and visual

alarm 34 being disposed in a visible location protected against shocks. All components of the device are further protected against moisture, the extinguishing agent and the pressure of the propellant gas.

The embodiments of the device according to the present invention depicted in Figs. 1 to 4 are preferred; however, other embodiments not including programmable electronic components -- in particular without a controller -- can also be realized.

CLAIMS

1) An electronic device designed to be used with an extinguisher (1) and comprising sensors (2, 3, 4, 12, 13, 14) of the malfunctioning and activation of said extinguisher (1) connected mechanically thereto, characterized in that the sensors (2, 3, 4, 12, 13, 14) are connected electrically to at least one alarm (10, 11, 33, 34) in such a way that said alarm or alarms (10, 11, 33, 34) are triggered as soon as one of the sensors (2, 3, 4, 12, 13, 14) detects a malfunction or an activation of the extinguisher (1).

2) A device according to Claim 1, characterized in that it is built into a handle on or in the body of the extinguisher (1).

3) A device according to Claim 1 or Claim 2, characterized in that the extinguisher (1) is a puncture-operated auxiliary-pressure extinguisher and in that one of the sensors (2) detects said puncture.

4) A device according to any of the foregoing claims, characterized in that the extinguisher (1) is a stored-pressure extinguisher and in that one of the sensors (12) is attached to a manometer measuring the pressure in the extinguisher (1) and detects the crossing of a pressure threshold.

5) A device according to any of the foregoing claims, characterized in that it comprises an electric power source (31) consisting of a cell, a battery or a photovoltaic cell.

6) A device according to any of the foregoing claims, characterized in that it comprises a sensor (3) attached to a mounting bracket of the extinguisher (1) and detecting the separation thereof from the said mounting bracket.

7) A device according to any of the foregoing claims, characterized in that it comprises a controller (5, 30) connected electrically to the sensors (2, 3, 4, 12, 13, 14) and to the alarms (10, 11, 33, 34) and controlling the operation of the device, the controller (5, 30) being connected electrically to a memory (6, 25) and to a clock (16) and loading into the memory (6, 25) the malfunction and activation data transmitted to it by the sensors (2, 3, 4, 12, 13, 14) and the dates transmitted to it by the clock (16).

8) A device according to Claim 7, characterized in that, the extinguisher being a puncture-operated auxiliary-pressure extinguisher, the controller (5, 30) is adapted to control said puncture.

9) A device according to Claim 7, characterized in that the memory (6, 25) stores dates from the history of the extinguisher (1) and the date of its next inspection and triggers an alarm (10, 11, 33, 34) when this date arrives.

10) A device according to any of Claims 7 to 9, characterized in that it comprises a keypad 35 and a display unit (8).

11) A device according to any of Claims 7 to [number cut off], characterized in that it comprises a keypad (23) and a display unit (22) and two connectors (7, 21) adapted to be connected together in such a way that the keypad (23) and the display unit (22) are disconnectable from the extinguisher (1).

12) A device according to any of Claims [number cut off] to 11, characterized in that the controller consists of a microcontroller (25) incorporating the memory (6).

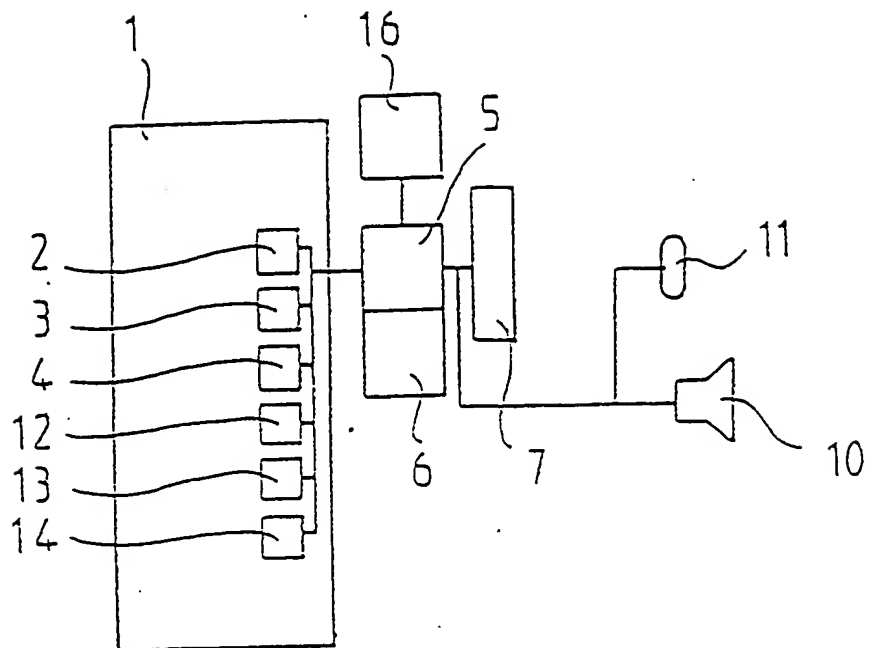


Figure 1

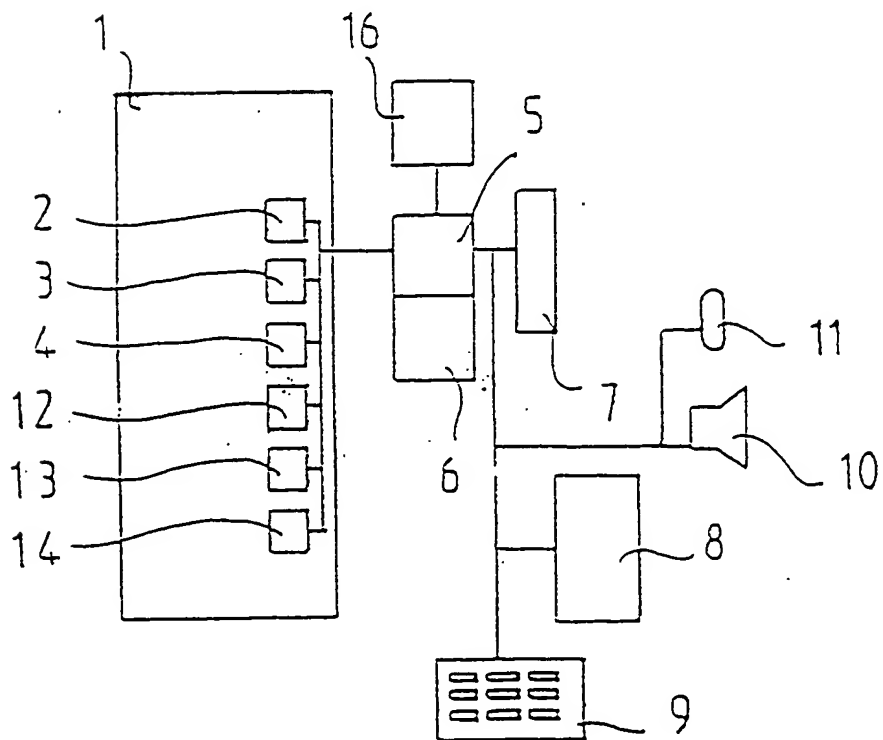


Figure 2

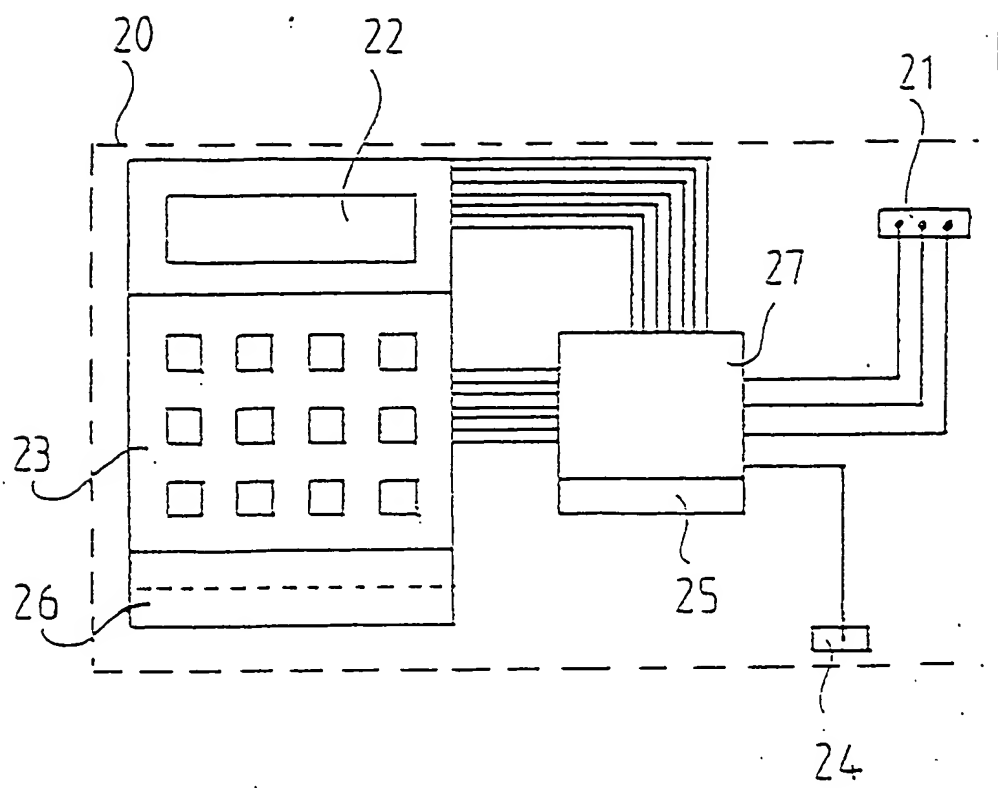


Figure 3

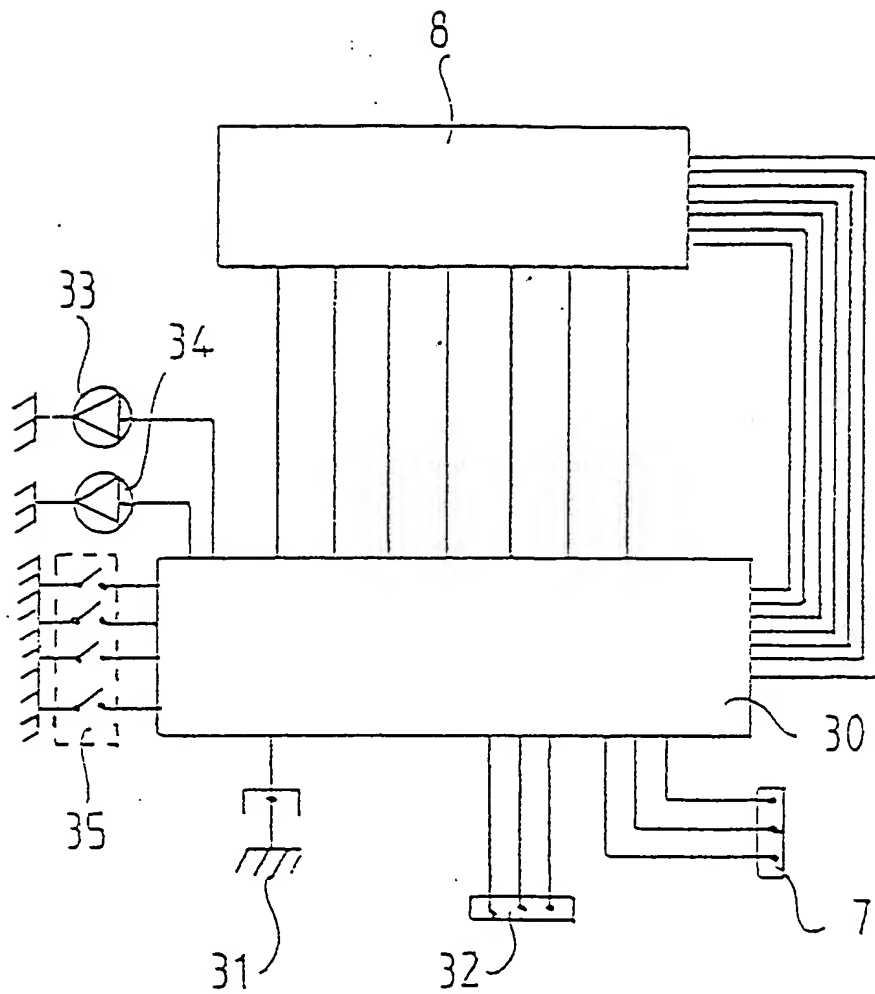


Figure 4